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Roundup

Are we alone in the universe?

This time-lapse image, which was taken during the Perseid Meteor Shower on Aug. 12, 2002, shows a Perseid meteor streaking across the beautiful desert skies over Joshua Tree National Park. Read about how scientists at Johnson Space Center are "more convinced" than ever that evidence found in meteorites supports the existence of primitive life on Mars. See story on page 8.

guest column

INTERNATIONAL SPACE STATION PROGRAM MANAGER, MICHAEL T. SUFFREDINI

Back on track

After a hiatus of more than three years we are back on track to fulfilling our commitment, to ourselves and our International Partners, of completing assembly of the International Space Station (ISS) by 2010. With the launch of Space Shuttle *Atlantis* (STS-115) on Sept. 9, we embarked on the most challenging chapter to date of the ISS Program.

The next several assembly flights include installation of the port inboard (P3/P4) integrated power truss segment, activation of the central cooling system, transition to the main bus switching unit power distribution system, reposition of Node 2 during three stage spacewalks, installation of the International Partner pressurized elements, and activation of the final power truss; and all of this will make for a daunting challenge.

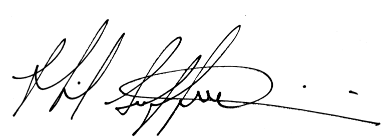
Thanks to the hard work of many folks on the ground and the extreme dedication of the STS-115 crew, we are off to a great start! With the installation of the P3/P4 truss, we have doubled the station's ability to generate power and added 17.5 tons to its mass. This was an extremely complex set of tasks and the success of this mission was crucial to enable the next phase of assembly that will be performed during the STS-116 mission, scheduled to launch in December.

Many have asked why we are building the space station. My response is, because the station is the "toehold" for human exploration of the planets. Every day we learn something more about living and working in space that can be applied to the preparations for these interplanetary trips. The space station will serve as a "test bed" for exploration systems and is the first stop for the Crew Exploration Vehicle, whose continued dockings and stays on station will help ensure its readiness for interplanetary crew transport.

The space station provides the opportunity for us to study human physiological and psychological adaptation to long-term stays in orbit. In addition, the shuttle's hiatus has provided us an opportunity to learn how to efficiently operate an orbital post with limited resupply opportunities. This knowledge is extremely important as we develop strategies to keep crew members and systems healthy during long-term stays in space far from our home planet.

So we find ourselves here at this time because we want to complete the journey that is the assembly of the space station. We want to get on with using the station in the way this world-class orbiting research facility was intended to be used. We want to complete this new star that one day will be bright enough to be viewed racing across the sky in daylight. We want to complete what has been called the most challenging engineering feat in the history of humankind. Accomplishment without challenge is just work, but doing what has never been done before is making history.

I am constantly in awe of the abilities and accomplishments of the JSC team. I know you will be successful in this journey we call ISS assembly, and I'm proud to be with you as you make history.



Can you hear me *now*?

by Brad Thomas

Satellites orbiting more than 22,000 miles above the Earth provide NASA with the ability to almost continuously monitor human spacecraft as they orbit the Earth. Tracking and communicating with the International Space Station and space shuttle is therefore relatively convenient.

But that has not always been the case.

Prior to the Tracking Data and Relay Satellite System (TDRSS) currently in use at NASA, the Mission Control Center (MCC) at Johnson Space Center had to rely on tracking stations situated in remote locations around the globe to track and communicate with human spacecraft. This system was called the Manned Spaceflight Network and later was referred to as the Ground Network.

MCC Operations Manager Jim Brandenburg has worked with both the Ground Network and the TDRSS. He said there is a huge difference in the coverage capabilities between the two systems. "Back then we had an average of 17 to 20 minutes of coverage per orbit," Brandenburg said. "Now with TDRSS, we have pretty much continuous coverage."

Brandenburg also said that back in the early days there were rare instances when as many as three hours could pass before a spacecraft's orbit would take it into the range of a ground station.

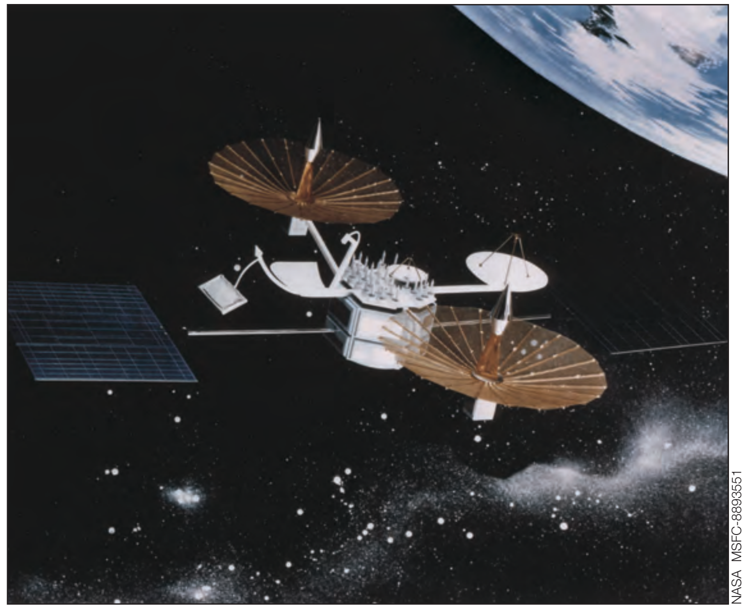
TDRSS became operational in 1986. This network of satellites is referred to as the Space Network. Most of the TDRSS satellites are controlled by two stations at NASA's White Sands Test Facility (WSTF) in New Mexico. The ground stations are operated by the Goddard Spaceflight Center. There is also one TDRSS satellite that covers the zone of exclusion (ZOE), which is controlled by a station in Guam. The ZOE is the area where there is no coverage provided by the other TDRSS satellites.

The satellites, which weigh 4,600 pounds and measure 57 feet across the solar arrays and 44 feet across the antennae, provide support to spacecraft in S-band and Ku-band frequencies.

Roy Harris, operations manager for the Mission Support Operations Contract for Honeywell, spent two years at the ground tracking station in the Canary Islands and two years in Guam in the 1970s. He also served as operations manager at the TDRSS tracking stations at WSTF from 1981 to 1990.

Harris said that the amount of data dispersed through TDRSS is about 1,000 times faster than could be transmitted in the past. Prior to TDRSS the information was transferred between the MCC and the ground stations and was transported by undersea cables and modems. "Now we can downlink 48 megabytes per second," Harris said. "The (maximum) rate for Apollo was 51.2 kilobytes per second."

The use of TDRSS also eliminated the inevitable blackout that occurred during entry for missions prior to 1986. Radio waves were unable to penetrate the cone-shaped sheath of ionized air that engulfed the spacecraft upon entry. Since a TDRSS satellite is in orbit, it can transmit and receive signals through the sheath. In addition to increased coverage and communication capabilities, TDRSS changed the way work was done. "With the remote tracking stations, everything was manually configured and required each station to be staffed by 80 to 100 people," Harris said. "With TDRSS, everything is automated."



This artist's concept drawing depicts the Tracking and Data Relay Satellite-C (TDRS-C), which was the primary payload of the Space Shuttle* Discovery *on the STS-26 mission, launched on Sept. 29, 1988. The TDRS-C was the third TDRSS satellite to be launched.

John Cornwell also served at the ground tracking station in Guam and is currently a telemetry and command manager for Honeywell. His group handles telemetry and command for the space shuttle and command for the space station. The group also handles scheduling TDRSS assets for shuttle and station missions. Cornwell said that life with TDRSS isn't always smooth. Since TDRSS is used for other orbiting U.S. spacecraft besides the station and shuttle, there are sometimes scheduling conflicts. The ever-changing dynamics of a shuttle flight forces schedulers to be on their toes, especially compared with the static station schedule. "After you lift off, you are constantly refining the schedule," he said. "The scheduler is always busy."

Even though life before TDRSS was not easy, those involved with the human spaceflight program got the job done. "It was a fact of life," Brandenburg said. "That is the way we trained and the way we flew."

SUPPORTING SPACE SHUTTLE MISSIONS

White Sands behind the scenes

by Cheerie R. Patneaude
NASA White Sands Test Facility

NASA/Elliott WSTF0905E07647

Employees from all over White Sands worked together to solve a shuttle thruster anomaly.

Nestled in the remote desert near Las Cruces, N.M., the White Sands Test Facility (WSTF) plays a necessary behind-the-scenes role in space shuttle missions.

This unique testing facility supports the NASA mission of safe human spaceflight through its distinctive expertise in testing all materials used in spaceflight, such as orbital maneuvering and reaction control subsystems. WSTF also handles hardware refurbishment and maintains specialized proficiency in hypergol-handling and oxygen systems hazard management.

"The level of commitment from White Sands is just incredible. If there's an issue, we're there," Brooks Wolle, chemical specialist for Jacobs Sverdrup, said. "There are a lot of go-to people out here. If they want something quick or need an answer, the phone rings."

For instance, during the launch of STS-115, "one of the protectors blew off of one of the thrusters, and there was an issue with water," Wolle said. "And they were out here in the chamber lab testing to make sure everything was okay."

Shuttle support-related projects conducted at the test facility give WSTF personnel the experience and proficiency to be consulted during a flight, meaning many employees are on alert during the mission. In the past, some have been called to support shuttle team members located at Johnson Space Center, White Sands Space Harbor (WSSH), and Kennedy Space Center (KSC).

"We're very big behind the scenes," said Shane Daugherty, a Propulsion Systems test technician for Jacobs Sverdrup. "We do a lot of testing."

WSTF workers perform valuable diagnostics essential to making sure the shuttle flies safety.

"We do penetrative testing, radiograph (x-ray) welds, ultrasound…basically all the disciplines of nondestructive testing to certify that welds and articles are to the right specification and able to be put back onto the shuttle," Wolle said. "We've dealt with the flow liner cracking, and we've done a lot of failure analysis of the coating chipping on the thrusters. A lot of questions get answered here."

During STS-121, an auxiliary power unit (APU), which deploys the shuttle's landing gear, steers the nose wheel and provides braking to the landing-gear wheels, developed a leak. Engineers at WSTF were called in to evaluate whether the leak was hydrazine or pressurant gas, and whether any possible risks could result from the leak.

"Recently with the anomaly of the APU, we gathered our people, looked at our data and made some decisions on the APU based on the testing we did," Daugherty said. "There's a lot of real-time interaction between our people here and the people at KSC and JSC regarding what to do in a given situation based on our experience."

The engineers' diagnostics work was instrumental in the decision to advocate landing the shuttle safely with the two functioning APUs.